Oct. 4, 1966 J. G. McKAY 3,276,357

PRINTING WHEEL FOR PACKAGE MARKING EQUIPMENT

Filed June 1, 1964

Fig. 1

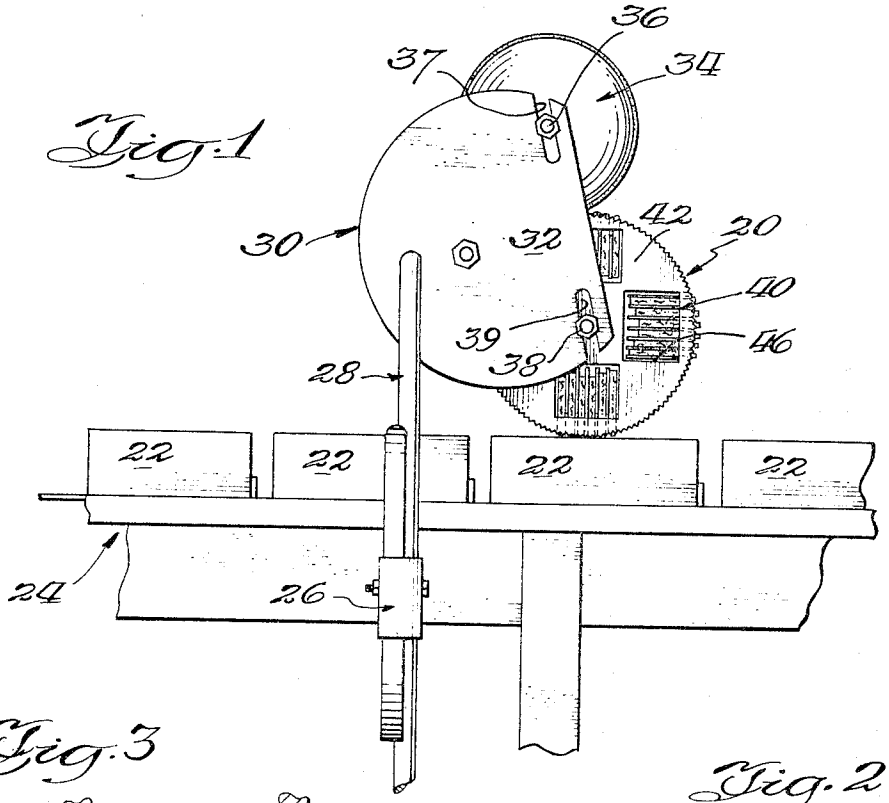


Fig. 3

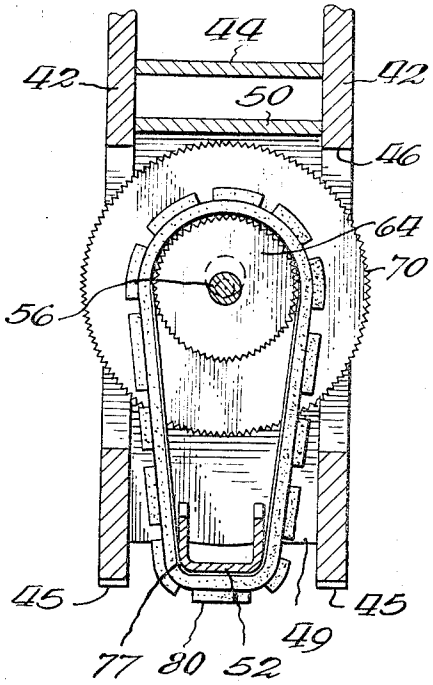
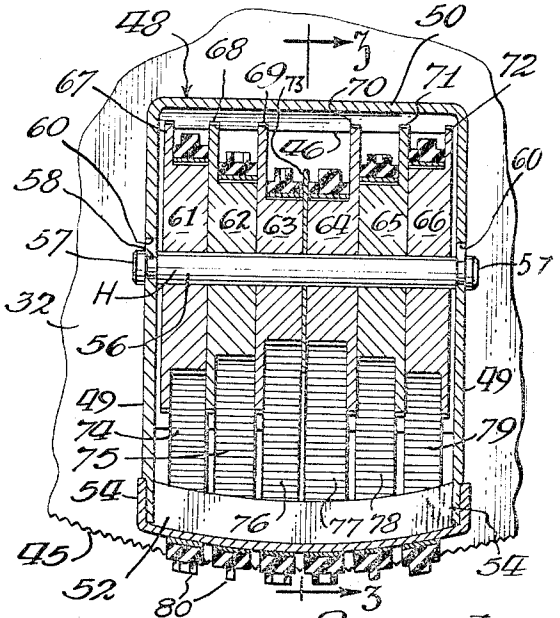


Fig. 2



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PRINTING WHEEL FOR PACKAGE MARKING EQUIPMENT

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This invention relates generally to a rotary printing wheel mounting adjustable printing units at spaced locations adjacent the periphery thereof and more particularly, relates to improvements in the construction of the adjustable printing unit used in such wheels.

The herein invention is concerned specifically with improvements in the kind of adjustable printing unit described and illustrated in my U.S. Patent No. 2,634,676 and referred to commonly as a numberer. Said numberer, which is identified generally by reference character **62** in said patent, contains a plurality of rubber type bands each having a selected series or sequence of numerical or alphabetical character type faces. These bands also can be provided in special combinations of numerals or letters. The bands are each mounted over a curved bridge member at one end of the numberer unit and a friction wheel freely rotatable on an axle and having a protruding knurled flange for selectively turning the wheel to change the face of the character of indicia positioned on the bridge for printing in a conventional manner. Notably, the curved bridge had a curvature which conformed to the curvature of the pair of circular discs between which the numberer unit was mounted. Since the bridge was curved, the distance between the shaft or axle mounting the friction wheels and the bridge varied substantially along the axis of the shaft. To keep the printing bands under uniform tension, some means had to be provided to compensate for this variation of distance. My patent accomplished this by enabling certain of the friction wheels to be revolved eccentrically with respect to others, notably, the center wheels of the set of four shown in FIG. 7 of my patent.

Other attempts to eliminate this problem have considered use of a curved shaft mounting the friction wheels. This however, has resulted in tilting or cocking of the friction wheels with attendant irregularity in the type face on the curved bridge and binding of the friction wheels on the shaft so that changes in type face could not be made. The problem is further complicated by the fact that the size of these numberer units vary. For instance, numberers using four or six bands are available. Also, the diameter of the printing wheel in which the numberer is used varies between models so that the curvature of the bridge used will vary accordingly. Consequently, the practice has been to use friction wheels of uniform diameter for all sizes of printing wheels. This procedure has been deemed advisable because of the necessity and/or desirability of changing bands. Consequently, uniform diameter or size friction wheels were employed substantially universally for what was believed to be customer convenience. However, under the circumstances, some means had to be employed for compensating for the variation in distance previously mentioned with attendant additional cost.

Accordingly, the primary object of this invention is to provide a printing wheel of the character described mounting an adjustable printing unit in which the friction wheels have different diameters for accommodating the rubber type bands and a straight axle is used for mounting said wheels whereby no special compensating means as previously discussed is required.

Another object of the invention is to provide a printing wheel of the character described in which said friction wheels of the numberer unit are provided in sets of pairs of wheels for use in combination with a bridge of predetermined curvature, the wheels of a particular pair being of identical diameter albeit the sets of pairs of wheels being of different diameter, the diameters of the wheels installed in a numberer unit being larger from the center outwardly toward the opposite ends of the shaft mounting the friction wheels of the numberer unit.

Other objects of the invention reside in economy of manufacture, ease of stocking and supplying parts for said numberers, the simple manner in which type band changes can be made, and more efficient operation of the numberer, all engendered by my novel improvements in the printing wheel of the character described.

The foregoing and other objects of the invention will become apparent from the ensuing disclosures in which a preferred embodiment of the invention is described in detail in the specification and illustrated in the accompanying drawing. Minor variations in construction and arrangement of parts may occur to the skilled artisan without departing from the scope or sacrificing any of the advantages of the invention.

In the drawing:

FIG. 1 is side elevational view of a printing wheel embodying the invention in a representative package marking installation.

FIG. 2 is an enlarged fragmentary section of view taken through one of the numberer units to show structural details.

FIG. 3 is a fragmentary sectional view taken through said numberer unit along the line **3**—**3** and in the general direction indicated.

Referring now to the drawing, the printing wheel embodying the invention is designated generally by the reference character **20** in FIG. 1. The printing wheel is illustrated operatively installed for marking each one of a line of packages **22** moving continuously past the wheel on a conveyor designated generally **24**. Also shown in FIG. 1 is a printing assembly mounted on the conveyor **22** and this assembly may include a C-clamp **26** of a conventional structure, a bracket **28** attached to the clamp **26** and extending upwardly above the conveyor. A frame **30** is attached to the bracket which may be rotatable on the bracket **28**.

The frame **30** consists of two identical plates such as the plate **32** seen in FIG. 1, the plates **32** being held together in a spaced apart assembly. The inking wheel **34** is rotatable on shaft **36** journalled at opposite ends thereof in the upper slots **37** opening to the perimeters of the plates **32**. The printing wheel **20** is freely rotatable on a shaft **38**, the opposite ends of which are secured in the lower slots **39**. As is well understood, the wheels **20** and **34** are adjustable in their position, one relative to the other by adjusting the relative positions of shafts in the slots **37** and **39** respectively.

With the exception of the printing wheel **20** which will be described in detail hereinafter, the component parts of the carton marking system are generally described are conventional and in this respect, recourse to my Patent No. 2,634,676 is recommended for a more detailed discussion of the general system.

The printing wheel **20** is intended to carry a plurality of numberers of identical construction so that for purposes of this disclosure, the numberer representative of the invention is designated generally **40**. The wheel **20** is formed by a pair of identical circular plates or discs **42** retained in spaced apart assembly by suitable spacers, such as **44**, and the shaft **38** mounting said plates. The perimeters **45** of the plates **42** are knurled or milled for obtaining a better purchase on a package **22** as the wheel **20** rolls over the same in normal operation of the marking system. The plates **42** have a pair of aligned rectangular openings, such as **46**, in association with which there is mounted a numberer **40** between the plates **42**.

Understandably, there will be a pair of aligned openings **46** for each numberer **40** carried by the printing wheel **20**. The pair of aligned openings **46** is spaced inwardly of the knurled edges **45**.

Each numberer **40** has a substantially U-shaped metal frame **48** provided by a pair of parallel legs **49** connected by the base or web **50**. The numberer **40** is mounted between the plates **42** so that the frame **48** borders three sides of a rectangular opening **46** and the numberer faces in a radially outward direction with the thickness of the frame **48** between the facing circumferential surfaces of the plates **42**. Across the free ends of the legs **49** is mounted a curved bridge member **52** of channel-shaped cross-section. The bridge part **52** has flanges **54** at opposite extremities thereof which are engaged with the free ends of the legs **49** to fix the configuration of the frame **48**.

The frame **48** mounts a plurality of friction wheels and printing bands or strips secured between said friction wheels and the curved bridge part **52** in accordance with this invention which engenders the important advantages thereof. Mounted between the legs **49** is a straight shaft **56**, the shaft **56** having each of its ends **57** provided with an annular groove **58**. The ends **57** are journalled in bearing openings **60** provided in the legs **49**, the grooves **58** each having the marginal edge of an opening **60** therein so that the shaft **56** is readily removable from between the legs **49**. The shaft **56** carries the friction wheels **61**, **62**, **63**, **64**, **65** and **66** having the same diameter mounting holes for shaft **56** as seen at H in FIG. 2, each having the usual knurled flanges **67**, **68**, **69**, **70**, **71** and **72** respectively. Between the wheels **63** and **64** is a spacing washer **73**. Rubber printing bands or strips **74**, **75**, **76**, **77**, **78** and **79** are carried by the respective wheels, each band being endless and extending around the respective friction wheel and the bridge **52**. The bands all carry rubber type for printing alphabetical characters, numerals or whatever special indicia or combination of indicia desired, the indicia being designated **80**. As seen in FIG. 3, the diameter of a flange **70** is greater than the width of frame **48** so as to extend through aligned openings **46** beyond the plates **42** respectively. Thus, the flanges **70**, as is the case with the other flanges also, can be manipulated for changing the face of type **80** positioned on bridge **52** for printing. As further noted from FIG. 3, the type **80** on bridge **52** projects a small distance beyond the knurled edges **45** of the discs **42** so that an imprint can be applied to the surface of package **22** against which the type **80** is pressed when the printing wheel is rotated by movement of the package **22** on the conveyor **24**, in a well known manner.

The friction wheels **61–66** are freely rotatable on the shaft **56**. As noted from FIG. 2, the distance normal to the shaft axis from the extremities of shaft **56** to the bridge part **52** differs at the said ends as compared to the medial portion of the shaft by reason of the curvature of the bridge. In order that the tapes or bands **74–79** will be under substantially uniform tension, some means for compensating for variation in distance normal to and between the shaft **56** and the bridge along the length of the shaft is necessary. The problem is further complicated by the requirement that the curvature of the bridge part **52** corresponds to the curvature of the discs **42**. Since there are different model sizes of printing wheels, the bridge curvatures will vary according to the size of the printing wheel. This means that the degree of variation in distances between the shaft along its length and the bridge referred to above will be different for different models of printing wheels.

I employ a straight shaft **56** and vary the sizes of the friction wheels. However, in each frame there is used a pair of wheels of the same diameter. Referring to FIG. 2, it may be understood that wheels **63** and **64** are of substantially identical diameter. Wheels **62** and **65** are of the same diameter and this is the circumstance with respect to wheels **61** and **66**. Thus, the diameter of the friction wheel is progressively larger from the midpoint of the shaft **56** outward to an extremity **57** thereof and in opposite directions. The diameter of the friction wheel of each identical pair will be selected to compensate for the variation in the distance along a line normal to the shaft **56** between the bridge **52** and said shaft so that the printing band carried on said wheel will be tightly installed.

Thus, the invention makes it possible for users of the carton marking systems to maintain different diameter printing wheels on hand for different jobs. The invention enables stocking of the different bridge parts **52** of different curvatures and pairs of friction wheels of identical diameter. Where a printing wheel of a specific diameter is to be used, the numbers **40** installed are provided with a bridge **52** which corresponds in curvature to the curvature of the printing wheel. Then, pairs of friction wheels are mounted on the shaft **56**, the diameters of which are dictated by the curvature of the bridge part used so that the printing bands will under uniform tension. Thus, the numberer may have four or six or even eight printing bands and there will be a pair of friction wheels of identical diameter for each pair of bands. The friction wheels of largest diameter will be at the ends of the shaft **56** and the smaller diameter pair of friction wheels will be on opposite sides of the midpoint of the shaft **56**. Because of the recourse to pairs of wheels of identical diameter and suitably coded or marked for use, the user of the printing wheel **20** will be enabled to install the friction wheels of different diameter on the shaft **56** without error in locating the same. Obviously, the bands used on the same wheels of a pair will be of the same size.

The hub diameters of the friction wheels will depend upon the curvature of the bridge **52** which, in turn, will depend upon the diameter of the printing wheel. This is apparent since the curvature of the bridge **52** conforms to the curvature of the plate **42**. As for the printing bands, there need be no variation in diameter between them because of their elastic character. Thus, the diameter for the bands in unstretched condition is selected which will assure that the band will fit any of the friction wheels and still remain in proper taut printing condition when stretched for mounting on the wheel.

The operation of the carton marking system shown in FIG. 1 and the printing wheel **20** with its numberers should be readily understood from the foregoing discussion as well as my Patent No. 2,634,676. This invention has been distinctly pointed out in the appended claims with the invention of invoking a liberal construction of the language thereof commensurate with the progress in the arts and sciences contributed thereby.

I claim:

1. In a printing wheel of the character described which mounts like adjustable numbering devices between a pair of circular plates and each numbering device has type faces protruding beyond the perimeter of the wheel for printing as the wheel is rolled upon a surface, a numbering device having a frame open at one end thereof and a bridge member secured across said open end proximate to the perimeter of the wheel, a straight shape removably journalled in the frame spaced from said bridge member, a plurality of friction wheels freely rotatable on said shaft, each of said friction wheels having one of a plurality of substantially similar continuous elastic bands of printing type extending over said friction wheel and the bridge member, said bridge member being curved to follow the curvature of said wheel, said friction wheels all having mounting holes for said shaft of the same diameter albeit said wheels varying in diameter along the length of the shaft for maintaining the printing bands under substantially uniform tension, there being multiple pairs of such friction wheels with the wheels of a specific pair being substantially similar in diameter thereof albeit

the pairs having different diameter wheels, the diameters of such wheels increasing progressively in an outward direction from the midpoint of said shaft.

2. A numbering device as described in claim 1 in which there is a wheel from each similar diameter pair on opposite sides of the midpoint of said shaft.

3. In a numberer for use in a printing wheel of the character described and having a U-shaped frame positioned therein with the open end adjacent to the perimeter of the printing wheel, a curved bridge secured across the open end of the frame, a straight axle removably journalled at opposite ends thereof in the frame and spaced from the bridge, plural pairs of friction wheels having substantially identical mounting holes mounted on the shaft for free rotary movement, and elastic type bands having substantially similar diameters mounted around the bridge and the respective wheels, said bands having raised surfaces that extend beyond the perimeter of the printing wheel, the individual wheels of each pair being equal in diameter albeit the diameters of the pairs are unequal, the wheel diameters decreasing

progressively from opposite ends of the shaft to maintain the uniform tension of the bands with the bridge following the curvature of the printing wheel, there being a wheel of each pair of said friction wheels on opposite sides of the midpoint of the shaft and the smallest pair of friction wheels are adjacent to said midpoint.

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